Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (currently amended) An antenna system, comprising:
a reflector having a modified-paraboloid shape; and
a multi-beam, multi-band feed array wherein:
said feed array is located close to a focal plane of said reflector;
said feed array includes at least one horn;
said feed array forms a plurality of multi-band beams, each of said plurality of multi-band beams being formed by a single horn of said feed array and each of said plurality of multi-band beams propagating signals over at least three frequency bands; and
said antenna system forms said plurality of beams so that each of said plurality of multi-band beams is congruent over said at least three frequency bands, and said plurality of beams is contiguous.

2. (original) The antenna system of claim 1, wherein:
said reflector is the single reflector of said antenna system; and
said reflector surface is non-frequency selective.

3. (canceled)

4. (original) The antenna system of claim 1, wherein said reflector is an offset reflector.

5. (original) The antenna system of claim 1, wherein said reflector is an axi-symmetric reflector.

6. (currently amended) The antenna system of claim 1, wherein:

said reflector is sized to produce a required beam size at a lowest frequency band; and

said reflector is oversized at a highest frequency band compared to a size to produce said required beam size at said highest frequency band.

7. (original) The antenna system of claim 1, wherein:

said reflector, having said modified-paraboloid shape, broadens a beam with moderate effect at a highest frequency band and at an intermediate frequency band and with minimal effect at a lowest frequency band.

8. (original) The antenna system of claim 1, wherein:

said multi-beam, multi-band feed array comprises a plurality of circular horns.

9. (canceled)

10. (currently amended) ~~The antenna system of claim 1~~ An antenna system, comprising:

a reflector having a modified-paraboloid shape; and

a multi-beam, multi-band feed array, wherein:

said feed array is located close to a focal plane of said reflector;

said feed array includes at least one horn;

said multi-beam, multi-band feed array is focused at a lowest frequency band, wherein a lowest frequency horn phase center of said at least one horn is located close to said focal plane; ~~and~~

said multi-beam, multi-band feed array is defocused at a highest frequency band and at an intermediate frequency band, wherein a highest frequency horn phase center and an intermediate frequency horn phase center are located behind said focal plane away from said reflector;

said feed array forms a plurality of beams, each of said plurality of beams being formed by a single horn of said feed array; and

said antenna system forms said plurality of beams so that each of said plurality of beams is congruent, and said plurality of beams is contiguous.

11. (original) The antenna system of claim 10, wherein said lowest frequency horn phase center of said at least one horn is located at said focal plane.

12. (currently amended) ~~The antenna system of claim 1~~An antenna system, comprising:

a reflector having a modified-paraboloid shape; and

a multi-beam, multi-band feed array, wherein:

said multi-beam, multi-band feed array is located close to a focal plane of said reflector;

said multi-beam, multi-band feed array comprises a plurality of feed horns; and

said feed horns are placed on a spherical cap with a radius of a distance from an aperture center of said reflector to said focal point, said radius of said spherical cap centered at the aperture center;

said multi-beam, multi-band feed array forms a plurality of beams, each of said plurality of beams being formed by a single feed horn of said feed array; and

said antenna system forms said plurality of beams so that each of said plurality of beams is congruent, and said plurality of beams is

contiguous.

13. (currently amended) ~~The antenna system of claim 1, further including~~ An antenna system, comprising:

a reflector having a modified-paraboloid shape;

a compact 6-port OMT/polarizer wherein said feed array provides dual-circular polarization capability at each of three distinct frequency bands; and

a multi-beam, multi-band feed array wherein:

said feed array is located close to a focal plane of said reflector;

said feed array includes at least one horn;

said feed array forms a plurality of beams, each of said plurality of beams being formed by a single horn of said feed array; and

said antenna system forms said plurality of beams so that each of said plurality of beams is congruent, and said plurality of beams is contiguous.

14. (original) The antenna system of claim 1, further including a beam forming network.

15. (currently amended) A reflector for an antenna system, comprising:

a non-frequency selective reflector surface, wherein:

said reflector surface has a modified-paraboloid shape;

said reflector is sized having an aperture D to produce a required beam size at a lowest frequency band; ~~and~~

said reflector is oversized at an intermediate frequency band, wherein said reflector is oversized in that a reflector having aperture D with unmodified paraboloid shape produces a beam size at said intermediate

frequency band that is smaller than said required beam size; and

said reflector is oversized at a highest frequency band, wherein said reflector is oversized in that a reflector having aperture D with unmodified paraboloid shape produces a beam size at said highest frequency band that is smaller than said required beam size.

16. (original) The reflector of claim 15, wherein said reflector is an offset reflector.

17. (original) The reflector of claim 15, wherein said reflector is an axi-symmetric reflector.

18. (original) The reflector of claim 15, wherein:

said reflector has a synthesized surface with a maximum peak-to-peak variation from a parabolic surface of 0.11 inch.

19. (original) The reflector of claim 15, wherein:

said reflector has a synthesized surface of modified-paraboloid shape; and

said synthesized surface is moderately shaped and disproportionately broadens higher frequency-band beams compared to lower frequency-band beams.

20. (original) The reflector of claim 15, wherein:

said reflector has a synthesized surface of modified-paraboloid shape; and

said synthesized surface forms identically-sized beams of 0.5 degree diameter at K-band, Ka-band, and EHF band.

21. (original) The reflector of claim 15, wherein:

said reflector has a synthesized surface of modified-paraboloid shape; and

said synthesized surface forms identically-sized beams of 0.5 degree diameter at C-band, X-band, and Ku band.

22. (currently amended) ~~The reflector of claim 15~~ A reflector for an antenna system, comprising:

a non-frequency selective reflector surface, wherein said reflector surface has a modified-paraboloid shape; and wherein:

said reflector is sized to produce a required beam size at a lowest frequency band; and~~, wherein:~~

said reflector is sized to have an aperture D according to:

D = 70 x (wavelength (at 20.2 GHz)) / (half-power beam-width)

to produce said required beam size at a K-band frequency taking the effect of beam broadening at K-band caused by said reflector having said modified paraboloid shape ~~shaping~~ into account; and

said reflector is oversized at a highest frequency band, wherein said reflector is oversized in that a reflector having aperture D with unmodified paraboloid shape produces a beam size at said highest frequency band that is smaller than said required beam size.

23. (currently amended) A feed array for an antenna system, comprising:

a plurality of high-efficiency multi-mode circular horns, wherein:

said feed array is focused at a lowest frequency band;

said feed array is defocused at an intermediate frequency band; and

said feed array is defocused at a highest frequency band.

24. (currently amended) The feed array of claim 23, wherein:

said feed array is defocused by 0.25 inch at EHF-band, being said highest frequency band;

said feed array is defocused by 0.1 inch at Ka-band, being said intermediate frequency band; and

said feed array is focused at K-band, being said lowest frequency band.

25. (original) The feed array of claim 23, wherein:

said feed array broadens an EHF beam and a Ka beam from 0.4 degrees to 0.5 degrees; and

said feed array forms a 0.5 degree beam at K-band.

26. (original) The feed array of claim 23, wherein:

a horn of said plurality of high-efficiency multi-mode circular horns of said feed array has an aperture diameter and a waveguide diameter;

said horn has a first step, between said aperture diameter and said waveguide diameter, at which the diameter of the circular cross-section of said horn abruptly changes;

said horn has a second step, between said first step and said waveguide diameter, at which the diameter of the circular cross-section of said horn abruptly changes.

27. (currently amended) ~~The feed array of claim 23,~~ A feed array for an antenna system, comprising:

a plurality of high-efficiency multi-mode circular horns, wherein:

said feed array is focused at a lowest frequency band;

said feed array is defocused at a highest frequency band; and wherein:

said feed array has a maximum feed size of 0.892 inch; and

each of said plurality of high-efficiency multi-mode circular horns

of said feed array is connected to a distinct compact 6-port OMT/polarizer wherein said feed array provides dual-circular polarization capability at each of the K, Ka, and EHF frequency bands.

28. (currently amended) ~~The feed array of claim 23,~~ <u>A feed array for an antenna system, comprising:</u>

<u>a plurality of high-efficiency multi-mode circular horns, wherein:</u>

<u>said feed array is focused at a lowest frequency band;</u>

<u>said feed array is defocused at a highest frequency band; and</u> wherein:

said feed array has a maximum feed size of 0.892 inch; and

each of said plurality of high-efficiency multi-mode circular horns of said feed array is connected to a distinct compact 6-port OMT/polarizer wherein said feed array provides dual-circular polarization capability at each of the C, X, and Ku frequency bands.

29. (currently amended) A satellite communication system comprising:

a radio frequency communication system;

an antenna system connected to said radio frequency communication system, wherein said antenna system includes:

a reflector having a non-frequency selective reflector surface, wherein:

said reflector is sized to produce a required beam size at a K-band frequency;

said reflector is oversized at an EHF-band frequency<u>, wherein said reflector is oversized at said EHF-band frequency compared to a reflector sized to produce a beam at said EHF-band frequency of said required beam size</u>;

said reflector surface is a synthesized surface of modified-paraboloid shape;

said synthesized reflector surface is moderately shaped and

disproportionately broadens EHF-band and Ka-band beams compared to K-band beams;

said synthesized reflector surface forms a 0.5 degree beam at K-band, Ka-band, and EHF band;

a multi-beam, multi-band feed array located at a focal point of said reflector, said feed array including a plurality of high-efficiency multi-mode circular horns, wherein:

said feed array is focused at a K-band frequency;

said feed array is defocused at a Ka-band frequency and an EHF-band frequency;

a horn of said plurality of high-efficiency multi-mode circular horns of said feed array has an aperture diameter and a waveguide diameter;

said horn has a first step, between said aperture diameter and said waveguide diameter, at which the diameter of the circular cross-section of said horn abruptly changes; and

said horn has a second step, between said first step and said waveguide diameter, at which the diameter of the circular cross-section of said horn abruptly changes.

30. (original) The satellite communication system of claim 29, wherein said reflector is an offset reflector.

31. (original) The satellite communication system of claim 29, wherein said reflector is an axi-symmetric reflector.

32. (original) The satellite communication system of claim 29, further including a ground terminal that simultaneously communicates with multiple satellites.

33. (original) The satellite communication system of claim 29, further

including an aircraft terminal that simultaneously communicates with multiple satellites.

34. (original) A method of propagating a multi-beam, multi-band radio signal comprising steps of:

forming a plurality of multi-band beams having at least three frequency bands wherein a lowest frequency band is formed in a focused mode, an intermediate band is formed in a defocused mode, and a highest ~~higher~~ frequency band is formed in a defocused mode; and

reflecting said multi-band beams off a shaped reflector to form ~~congruent~~ multi-band beams that are congruent over the at least three frequency bands and are contiguous.

35. (original) The method of claim 34, wherein said forming step comprises:

forming a K-band beam in a focused mode while forming a Ka-band beam and an EHF-band beam in a defocused mode so that said Ka-band beam and said EHF-band beam are broadened more than said K-band beam.

36. (original) The method of claim 34, wherein said forming step comprises:

forming a C-band beam in a focused mode while forming an X-band beam and a Ku-band beam in a defocused mode so that said X-band beam and said Ku-band beam are broadened more than said C-band beam.

37. (original) The method of claim 34, wherein said reflecting step comprises:

reflecting a K-band beam, a Ka-band beam, and an EHF-band beam from a synthesized reflector surface; and

disproportionately broadening said EHF-band beam and said Ka-

band beam compared to said K-band beam; and

forming a 0.5 degree beam at K-band, Ka-band, and EHF band.

38. (original) The method of claim 34, wherein said reflecting step comprises:

reflecting a C-band beam, an X-band beam, and a Ku-band beam from a synthesized reflector surface; and

disproportionately broadening said Ku-band beam and said X-band beam compared to said C-band beam; and

forming a 0.5 degree beam at C-band, X-band, and Ku band.

39. (currently amended) ~~The method of claim 34, wherein said forming step further includes a step of~~ A method of propagating a multi-beam, multi-band radio signal comprising steps of:

forming a plurality of multi-band beams including forming a circularly polarized beam using an OMT/polarizer, wherein a lowest frequency band is formed in a focused mode and a higher frequency band is formed in a defocused mode; and

reflecting said multi-band beams off a shaped reflector to form congruent multi-band beams that are contiguous

40. (original) The method of claim 34, wherein said forming step further includes a step of forming a multi-band beam using a beam forming network.

41-42. (canceled)